Impact of a thin plantar orthopaedic insert on posture and locomotion

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INTRODUCTION

EMI® (Medio-Intern Element):
- Podiatrist tool included in insoles
- Correction of postural deficiency:
Contralateral effect of a 3 mm high EMI® on ML displacement of the CoP of healthy participants[1]
- Effect on Eye convergence[2]

=> Lack of evaluation

=> Only on static tasks


EMI® on insoles

AIM AND HYPOTHESIS

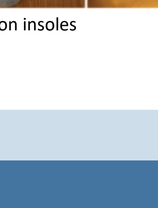
Aim: Evaluate the effect of the EMI® on posture and locomotion

Hypothesis: effect of EMI® on ML and AP axis and on Ellipse surface

DESIGN AND ANALYSIS

- Participants: 19 healthy volunteers (9♂, 10♀, 27.05 yrs (±4.24))
- EMI® conditions: control (without), under left foot, under right foot

● Static (Force plate ATMI®)



Conditions:
- Feet: parallel and 30° angle
- Eyes: open and close

Analysis:

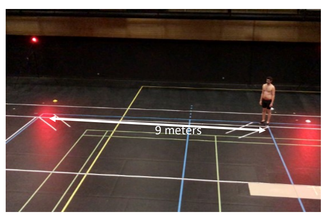
CoP displacement on ML and AP axis :
- Average position: $\overline{ML}$ $\overline{AP}$
- Between trials within subject variability: BTV_{AP}, BTV_{ML}
- Within trial within subject variability

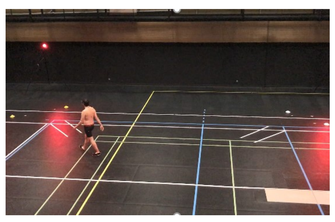
Ellipse Area

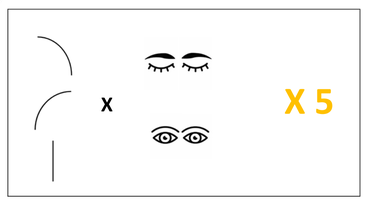
● Locomotion (Vicon®)

Design based on Podokinetic after rotation (PKAR) protocol[3,4] (30' of walking stimulation)

Conditions:
- Eyes: open and close
- Trajectory: straight, turn left 90°, turn right 90°

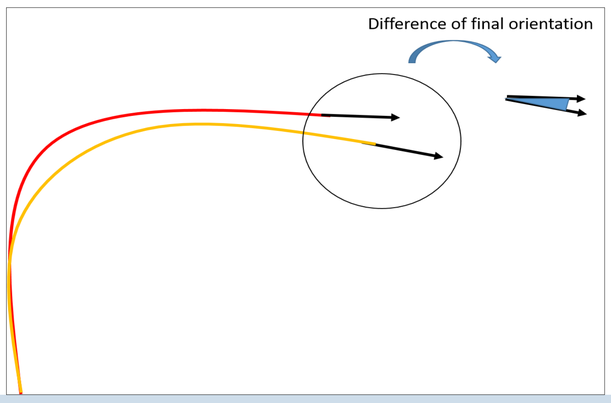






Analysis:

Comparison between the difference in final orientation of locomotion with/without vision, with a EMI® and without a EMI®

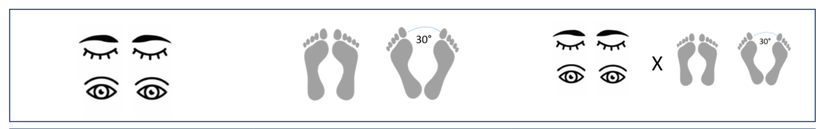


RESULTS

STATIC:

Only significant effects on feet position, eye condition and interaction between eye and feet position.

No significant effect of EMI®



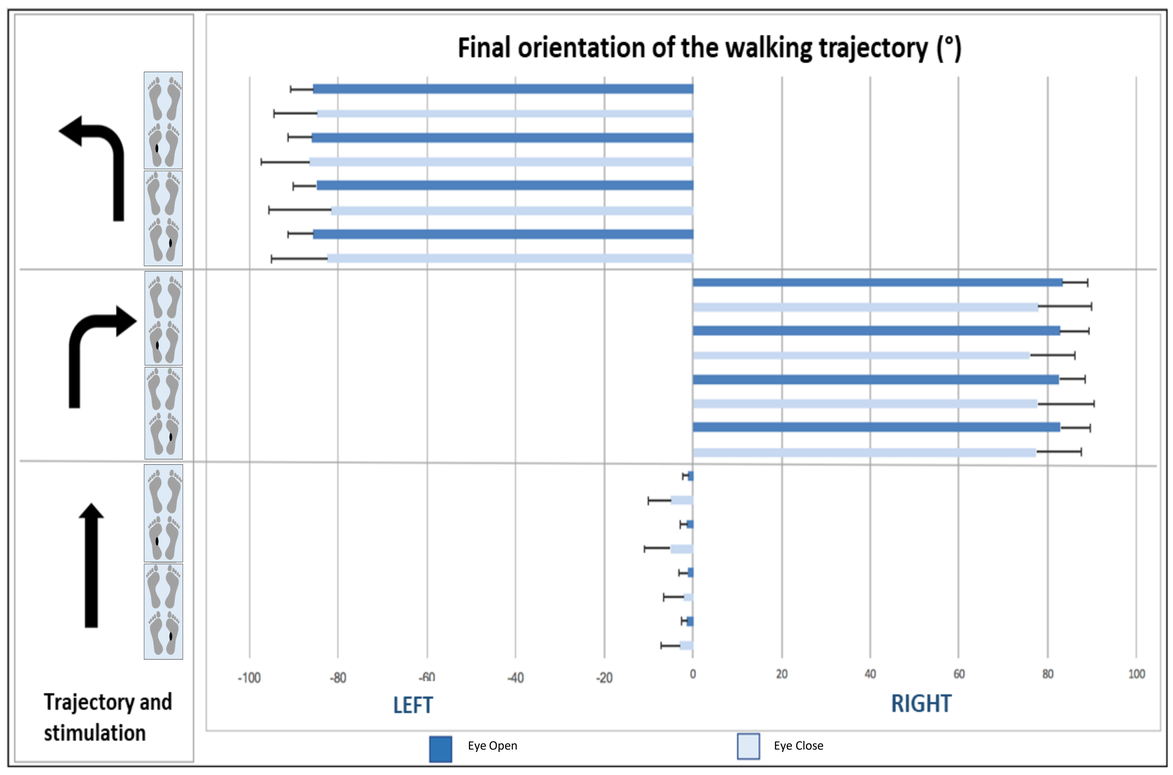
$\overline{ML}$	*** η^2_p = 0,618	*** η^2_p = 0,511	*** η^2_p = 0,526
$\overline{AP}$		** η^2_p = 0,359	** η^2_p = 0,287
Surface Area		*** η^2_p = 0,776	
BTV_{ML}	* η^2_p = 0,210		
BTV_{AP}		*** η^2_p = 0,871	

Results of the 4 ways repeted mesures ANOVA (EYExFOOTxEMIxEMIside)

Significant effects are represented as well as their size effect (η^2_p)

LOCOMOTION:

No significant effect of EMI® on the final orientation of the walking



CONCLUSION AND FUTURE WORKS

Our protocol, involving **healthy participants**, was not able to show significant effect of EMI® on posture and locomotion

Feet positions has significant effects on posture: clinical activities have to be standardized to be able to compare CoP movement.

Future works:

- Evaluate population with foot postural deficiency:
  More effect of EMI® on eye vergence on a population with foot postural deficiency[2]
- Normalize the evaluation of foot postural deficiency:
  No standardized procedure (compare foam effect[2] on CoP with Depron®)

BIBLIOGRAPHY

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[2]Foisy A, et al. (2015) Controlling Posture and Vergence Eye Movements in Quiet Stance: Effects of Thin Plantar Inserts. PLoS ONE 10(12): e0143693.

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[4]Earhart, G. M. (2013). Dynamic control of posture across locomotor tasks. *Movement Disorders*, *28*(11), 1501-1508.